

PATENT
(Docket No. 01154)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Andreas Poppe
Berthold Austrup
Hubert Baumgart

Serial No.: This application is a National
Phase Application of
PCT/EP2004/052817

Filed: herewith

For: PSEUDOPLASTIC AQUEOUS
DISPERSIONS, METHOD FOR
THEIR PRODUCTION AND
USE THEREOF

Group Art Unit: Unknown

Examiner: Unknown

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below

April 24 2006

Date


Marjorie Ellis

Box PCI
Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-1450

Sir:

This preliminary amendment is submitted with the application for entry into the
U.S. National Phase under Chapter II. This application is based on
PCT/EP2004/052817 filed on 27 October 2004, which claims priority to
DE 103 1 251 9, filed 3 November 2003. In connection with the filing of this
National Phase application, please make the following preliminary amendments.

In the Specification:

Please delete the title and insert the following title.

PSEUDOPLASTIC AQUEOUS DISPERSIONS, METHOD FOR THEIR
PRODUCTION AND USE THEREOF

Following the title, insert--

Cross Reference to Related Applications

This application is based on PCT/EP2004/052817 filed on 27 October 2004,
which claims priority to DE 103 51 251.9, filed 3 November 2003.

Page 1, line 3 -Insert therefore --Background of the Invention--.

Page 3, line 5, insert --Summary of the Invention--.

Page 4, line 16 insert --Detailed Description of the Invention--.

Please amend the claims as follows:

1. (Original) A pseudoplastic aqueous dispersion comprising particles (P) which are solid and/or of high viscosity, are dimensionally stable under storage and application conditions, are in dispersion in a continuous aqueous phase (W), and comprise surface-modified nanoparticles (N) whose surface is covered fully or almost fully by

(G1) modifying groups which

- are attached covalently to the surface via functional linker groups (a) and
- comprise inert spacer groups (b) and
- comprise functional reactive groups (c) which are attached via the groups (b) to the groups (a) and are inert toward the functional reactive groups of the surface to be modified, and

(G2) modifying groups which

- are attached to the surface via functional linker groups (a) containing at least one silicon atom,
- comprise inert groups (e), and
- have a smaller hydrodynamic volume V_H than the modifying groups (G1).

2. (Original) The pseudoplastic aqueous dispersion as claimed in claim 1, wherein the surface of the nanoparticles (N) is additionally covered by

(G3) modifying groups which

- are attached covalently to the surface via at least one functional linker group (a) and
- comprise at least one inert group (d) which is attached to the surface via the group (a) and has a smaller hydrodynamic volume V_H than the inert spacer group (G1b).

3. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in claim 1 ~~or 2~~, wherein the hydrodynamic volume V_H can be determined by at least one of means of photon correlation spectroscopy or can be estimated from the relationship

$$V_H = (r_{cont}/2)^3,$$

in which r_{cont} is the effective contour length of a molecule.

4. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 3~~ claim 1, wherein the functional reactive groups of the surface to be modified are hydroxyl groups

5. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 4~~ claim 1, wherein the functional linker group (G1a) contains at least one silicon atom.

6. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 5~~ claim 1, wherein the inert spacer group (G1b) is an at least divalent organic radical R.

7. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in claim 1, ~~any one of claims 1 to 6~~, wherein the functional reactive group (G1c) can be activated thermally and/or with actinic radiation.

8. (Original) The pseudoplastic aqueous dispersion as claimed in claim 7, wherein the thermally activatable functional reactive group (G1c) is a blocked isocyanate group and the functional reactive group (G1c) which can be activated with actinic radiation is selected from the group consisting of groups containing at least one carbon-carbon multiple bond.
9. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 2 to 8~~ claim 2, wherein the functional linker group (G3a) is selected from the group consisting of ether, thioether, carboxylate, thiocarboxylate, carbonate, thiocarbonate, phosphate, thiophosphate, phosphonate, thiophosphonate, phosphite, thiophosphite, sulfonate, amide, amine, thioamide, phosphoramidate, thiophosphoramidate, phosphonamide, thiophosphonamide, sulfonamide, imide, hydrazide, urethane, urea, thiourea, carbonyl, thiocarbonyl, sulfone, and sulfoxide groups.
10. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 9~~ claim 1, wherein the inert group (G3d) and the inert group (G2e) are monovalent organic radicals R^2 .
11. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in claim 10, wherein the monovalent organic radicals R^2 are selected from the group consisting of aliphatic, cycloaliphatic, aromatic, aliphatic-cycloaliphatic, aliphatic-aromatic, cycloaliphatic-aromatic ~~or~~ and aliphatic-cycloaliphatic-aromatic radicals.
12. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 10~~ claim 1, wherein the inert groups (G1b), (G2e) and (G3d) contain at least one of an at least divalent functional group and/or at least one substituent.

13. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 12~~claim 1, wherein the surface-modified nanoparticles (N) are ~~preparable~~ prepared by reacting the functional reactive groups of the surface of nanoparticles (N') for modification with

(M1) at least one modifier comprising

- at least one functional reactive group (M1a) which is reactive toward the functional reactive groups of the surface to be modified,
- at least one inert spacer group (G1b), and
- at least one functional reactive group (G1c) which is attached to the group (M1a) via the group (G1b) and which is inert toward the functional reactive groups of the surface to be modified, and

(M2) at least one modifier having a smaller hydrodynamic volume V_H than the modifier (M1) and comprising

- at least one functional reactive group (M2a) which contains at least one silicon atom and is reactive toward the functional reactive groups of the surface to be modified, and
- at least one inert group (G2e).

14. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in claim 13, wherein the surface-modified nanoparticles (N) are ~~preparable~~ prepared by additionally reacting the functional reactive groups of the surface of nanoparticles (N') for modification with

(M3) at least one modifier comprising

- at least one functional reactive group (M3a) which is reactive toward the functional reactive groups of the surface to be modified, and
- at least one inert group (G3d) having a smaller hydrodynamic volume V_H than the inert spacer group (G1b).

15. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in claim 13 ~~or 14~~, wherein the modifier (M1) is selected from the group consisting of silanes of the general formula II:



in which the indices and variables are defined as follows:

m and n are integers from 1 to 6;

o is 0, 1 or 2;

G1c is a group which can be activated thermally and/or with actinic radiation, as defined above;

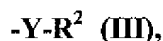
R is an at least divalent organic radical, ~~as defined above~~;

R^2 is a monovalent organic radical, ~~as defined above~~ selected from the group consisting of aliphatic, cycloaliphatic, aromatic, aliphatic-cycloaliphatic, aliphatic-aromatic, cycloaliphatic-aromatic and aliphatic-cycloaliphatic-aromatic radicals; and

R^3 is a hydrolyzable atom or hydrolyzable group.

16. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in claim 15, wherein the hydrolyzable atom R^3 is selected from the group consisting of hydrogen, fluorine, chlorine, and bromine atoms and the hydrolyzable group R^3 is selected from the group consisting of hydroxyl groups and monovalent organic radicals R^4 .

17. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in claim 16, wherein the monovalent organic radical R^4 is selected from the group consisting of groups of the general formula III:



in which the variable Y is an oxygen atom or a carbonyl group, carbonyloxy group, oxycarbonyl group, amino group $-NH-$ or secondary amino group $-NR^2-$ and the variable R^2 is as defined above a monovalent organic radical selected from the group consisting of aliphatic, cycloaliphatic, aromatic, aliphatic-cycloaliphatic, aliphatic-aromatic, cycloaliphatic-aromatic and aliphatic-cycloaliphatic-aromatic radicals.

18. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 13 to 15~~ claim 13, wherein the silanes (M1) of the general formula II are ~~obtained~~ able by

(1) reacting polyisocyanates with blocking agents and with silanes of the general formula IV:

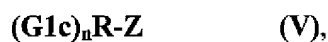


in which the variable Z is an isocyanate-reactive functional group
and the variables R , R^2 and R^3 are as indicated above; or wherein
R is an at least divalent organic radical:

R^2 is a monovalent organic radical; and

R^3 is a hydrolyzable atom or hydrolyzable group; and

(2) reacting compounds of the general formula V:

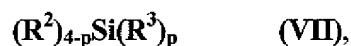


in which the index n and the variables G1c, R and Z are as
indicated above, with silanes of the general formula VI:



in which the index m and the variables R, R^2 and R^3 are as
indicated above.

19. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in
any one of claims 13 to 18, wherein the modifier (M2) is selected
from the group consisting of silanes of the general formula VII:



in which the index p = 1, 2 or 3 and the variables R^2 and R^3 are as defined above.
wherein

R^2 is a monovalent organic radical; and

R³ is a hydrolyzable atom or hydrolyzable group.

20. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any of claims 14 to 19~~claim 14, wherein the modifier (M3) is selected from the group consisting of hydroxyl-containing compounds of the general formula VIII:



in which the variable R² ~~is as defined above~~a monovalent organic radical.

21. (Original) The pseudoplastic aqueous dispersion as claimed in claim 20, wherein the hydroxyl-containing compounds of the general formula VIII are primary aliphatic alcohols.

22. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 21~~claim 1, wherein the nanoparticles (N') for modification are selected from the group consisting of metals, compounds of metals, and organic compounds and mixtures thereof.

23. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in claim 22, wherein the metals are selected from main groups three to five, ~~and transition groups three to six~~, and also groups one and two of the periodic table of the elements ~~and also from the lanthanides.~~

24. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in claim 22 ~~or 23~~, wherein the compounds of the metals are at least one of oxides, oxide hydrates, sulfates, hydroxides ~~or and~~ phosphates.

25. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 24~~claim 1, wherein the surface-modified nanoparticles (N) are ~~prepared~~prepared by reacting the nanoparticles (N') for modification in a first process stage with at least one modifier (M1) and in a second process stage with at least one modifier (M2).

26. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in claim 25, wherein the surface-modified nanoparticles (N) are ~~prepared~~prepared by reacting the nanoparticles (N') for modification in the first process stage with a modifier (M1) and also

- in the second process stage with at least one modifier (M3) and in the third process stage with at least one modifier (M2), or
- in the second process stage with at least one modifier (M2) and in the third process stage with at least one modifier (M3), or
- in the second process stage with at least one modifier (M2) and with at least one modifier (M3).

27. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in claim 25 ~~or 26~~, wherein the modifiers (M1) and (M2) and also, where used, (M3) are employed in an amount which is sufficient for the full or almost full coverage of the surface of the nanoparticles (N') for modification.

28. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims~~ claim 15 to 24, wherein the surface-modified nanoparticles (N) are ~~preparable~~prepared by subjecting at least one modifier (M1) of the general formula II and at least one modifier (M2) of the general formula VII to joint hydrolysis and condensation

29. (Original) The pseudoplastic aqueous dispersion as claimed in claim 28, wherein the surface-modified nanoparticles (N) are preparable by additionally reacting the resultant surface-modified nanoparticles (N) with at least one modifier (M3).

30. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 29~~claim 1, wherein the dimensionally stable particles (P) comprise the surface-modified nanoparticles (N) in an amount of from 1 to 40% by weight, based on (P).

31. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 30~~claim 1, wherein the dimensionally stable particles (P) comprise at least one polymeric and/or oligomeric binder.

32. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 31~~claim 1, comprising in the dimensionally stable particles (P) and/or in the aqueous phase (W) at least one additive selected from the group consisting of crosslinking agents, color and/or effect pigments, organic pigments, and inorganic pigments, transparent fillers, or opaque fillers, other nanoparticles different than the surface-modified nanoparticles (N), reactive diluents, UV absorbers, light stabilizers, free-radical scavengers, devolatilizers, slip additives, polymerization inhibitors, photoinitiators, initiators of free-radical polymerization, initiators of or cationic polymerization, defoamers, emulsifiers, wetting agents, dispersants, adhesion promoters, leveling agents, film-forming auxiliaries, rheology control additives (thickeners), flame retardants, siccatives, dryers, antiskinning agents, corrosion inhibitors, waxes, and flattening agents.

33. (Currently Amended) The pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 32~~claim 1, comprising the dimensionally stable particles (P) in an amount of from 5 to 70% by weight, based on the pseudoplastic aqueous dispersion.
34. (Currently Amended) A process for preparing a pseudoplastic aqueous dispersion as claimed in ~~any one of claims 1 to 33~~claim 1, which comprises mixing at least one dispersion (D) of surface-modified nanoparticles (N) whose surface is covered fully or almost fully by modifying groups (G1) and modifying groups (G2) in an aprotic, liquid, organic medium (O) with the remaining constituents of the dimensionally stable particles (P) and dispersing the resultant mixture (P) in an aqueous phase (W) so as to give the dimensionally stable particles (P).
35. (Original) The process as claimed in claim 34, wherein the surface of the surface-modified nanoparticles (N) is additionally covered by modifying groups (G3).
36. (Currently Amended) The process as claimed in claim 34 ~~or 35~~, wherein the aprotic, liquid, organic medium (O) comprises or ~~consists of~~ comprises at least one of an aprotic organic solvent and/or at a least one reactive diluent.
37. (Original) The process as claimed in claim 36, wherein the aprotic organic solvents and/or reactive diluents, in terms of the modifying groups (M1) and, where used, (M3), have a Flory-Huggins parameter $\chi > 0.5$.
38. (Currently Amended) The process as claimed in ~~any one of claims 34 to 37~~, wherein the dispersion (D) has a surface-modified nanoparticle (N) content of at least 30% by weight.

39. (Canceled)

40. (New) A composition comprising the aqueous pseudoplastic dispersion claimed in claim 1, comprising at least one of a coating material, adhesive or sealant.

Please delete the Abstract and insert the following replacement Abstract:

Abstract

Pseudoplastic aqueous dispersions comprising particles which are solid and/or of high viscosity, are dimensionally stable under storage and application conditions,
5 are in dispersion in a continuous aqueous phase and said particles comprise surface-modified nanoparticles whose surface is covered fully or almost fully by modifying groups, processes for preparing them, and their use

REMARKS

Upon entry of the preliminary amendment, claims 1-38 and 40 are pending in the application. Claim 39 has been canceled. The claims have been amended to comport with U.S. Patent Office regulations. New claim 40 is added by this amendment. The amendment is supported in the specification at page 31, lines 5-16 and does not constitute new subject matter. Examination of the claims is respectfully requested.

Respectfully submitted,



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April 24, 2006
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